

MASTER OF SCIENCE IN METEOROLOGY

EVALUATION OF EM PROPAGATION MODELS USING DATA FROM WALLOPS ISLAND EXPERIMENT (2000)

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The Royal Navy and the United States Navy emphasize utilizing the environment to achieve a tactical edge. Such approaches are outlined in Sea Power 21. This thesis recognizes accurate characterization of the physical battlespace as vital to concepts of both self-defense (Sea Shield) and strike (Sea Strike). Electromagnetic (EM) propagation is presented as a vital factor in the performance of a wide variety of ship, land, and airborne sensors and weapon systems. Atmospheric influences on EM propagation are related to gradients of temperature and humidity within the atmosphere. It is emphasized that modern maritime warfare is increasingly concentrated in the coastal theatre, an area in which atmospheric variability is often at maxima in both the vertical and horizontal. This thesis examines, using currently available technology and operational methods, how well the physical EM battlespace is described. Propagation models from the U.K. and U.S. are used to evaluate the propagation environment within the coastal zone, using measured data collected from the East Coast of the USA at Wallops Island during 2000, as a comparison. The main findings relate to the large potential errors, due the inability to measure and characterize the variability of the coastal environment under simulated, operational scenarios.

KEYWORDS: EEMS, AREPS, RF Propagation, Refractivity, Coastal Variability, Wallops Island, Surface Ducting and Evaporative Ducting Effects, Operational Simulation

